ORIGINAL ARTICLE

Use of permitted drugs in Italian professional soccer players

Emanuela Taioli

Br J Sports Med 2007;**41**:439–441. doi: 10.1136/bjsm.2006.034405

See end of article for authors' affiliations

Correspondence to: Dr E Taioli, University of Pittsburgh Cancer Institute, UPMC Cancer Pavilion, 5150 Centre Avenue, Fourth Floor, Pittsburgh, PA 15232, USA; taiolien@upmc.edu

Accepted 7 February 2007
Published Online First 22 February 2007

Objectives: To assess the frequency and quantity of usage of permitted drugs by Italian professional soccer players.
Methods: A cohort of 1041 professional soccer players from the two Italian major leagues was assembled during the season 2003–4; 743 of the 785 (94.6%) subjects available on the day of the interview answered an epidemiological questionnaire, which included questions on the type and frequency of use of several permitted drugs.
Results: 92.6% of players reported having used oral anti-inflammatory products in the previous year, and most of them were current users (86.1%). 36% of the players, mostly current users, reported the use of analgesics. 82.8% of the players reported current use of supplements, and 28% reported using vitamins.
Conclusions: The regular use of several permitted drugs is very high among professional soccer players. The description of players' behaviour is the first step towards regular monitoring of the players' need for, and use of, vitamins, supplements and other permitted drugs.

The use of illicit drugs in professional sports has been a matter of strong interest. Although several sources, some of which are anecdotal and some are related to judicial inquiries,[1–4] indicate that illegal drugs are widely used in sport settings, the use of permitted drugs has been seldom studied.[5 6]

There are surveys of the use of drugs in adolescents in school and college sport teams,[7] but few data are available on professional players, mostly because access to large numbers of elite athletes is restricted, and because elite athletes are generally reluctant to discuss their habits.[8] One study conducted on English professional soccer players reported data on supplement and vitamin use in a selected sample of subjects,[9] and another study reported information on permitted drug usage in Olympic athletes, not involving soccer.[6]

The objective of this study was to gather data on permitted drug use in Italian professional soccer players, in order to create a realistic picture of the players' use of anti-inflammatory and antidolorific drugs, supplements and vitamins.

SUBJECTS AND METHODS

Soccer players from 39 of 42 teams belonging to the A and B leagues during the 2003–4 season were contacted and asked to answer an epidemiological questionnaire and donate a saliva sample. More details about the planning and conduct of the study are reported elsewhere.[10] Among the 1041 identified subjects, 785 were available on the day of the interview, and 743 (94.6%) agreed to participate in this study.

With the cooperation of the Italian Soccer Association, the Italian Federation of Soccer and the Italian Federation of Sport Physicians, a questionnaire was prepared, which included demographic and anthropometric data, history of vaccinations, smoking and drinking habits, occupational exposure, family history of chronic diseases, use of medicines and vitamins. Details on their careers as soccer players included participation in previous teams, roles played and history of trauma, fractures and surgery. The main aim of this study was to collect information about the health status of the soccer players; therefore the questionnaire did not ask about players' own use of drugs or about recreational drugs. The informed consent signed by all the players included a description of the aim of the study, a brief list of the main questions included in the questionnaire and a detailed explanation of the future use of the collected data, according to the Italian laws on privacy in scientific studies.

In addition, a brief questionnaire was filled in by the team doctors, to gather details on the therapeutic schemes used for traumas and for other common pathologies, as well as the type and dosage of vitamins and supplements usually prescribed to the players. Information on recommended vaccinations and on general preventive activity performed by the doctor on the team was also collected. Of the 18 team doctors from the A league, 12 answered the questionnaire, and 17 of 18 doctors from the B league answered the questionnaire.

Information on permitted drugs was collected according to the following categories: anti-inflammatory, analgesics, antibiotics and supplements. For each category, we asked for the brand, the formulation (oral, suppository, intravenous), whether the player was a current or a past user, or had never used them, and the dosage and frequency of use both on a daily and a monthly basis. We were able into correctly reclassify the drugs into the appropriate category using the commercial name reported by the player. We then calculated a cumulative year's dosage by multiplying the monthly dosage by 12, and the daily dosage by 365. For this analysis, topical use of drugs was not included.

Statistical analysis

Continuous variables are presented as mean (SD), and categorical variables are shown as frequencies and percentages. The independent contribution of several factors (role and age of the player, weekly hours of training, number of training sessions, body mass index) on permitted drug use was assessed using a multivariate general linear model.

RESULTS

Table 1 reports the description of the population under study. The subjects were all men, mean (SD) age 26.5 (4.6) years, with a mean career length of 8.5 (4.6) years. The mean age at the start of professional activity was 7.4 (2.3) years (range 3.0–18.0 years).

Table 2 shows some of the data available from the questionnaire on the amount of physical activity usually performed by this cohort. Wide variability in response was

Table 1 Description of the cohort of soccer players

Place of birth	
Italy	597 (80.5)
Other countries in Europe	61 (8.3)
Brazil	20 (2.7)
Argentina	20 (2.7)
Uruguay	9 (1.2)
Other (central/south America)	12 (1.6)
Africa	18 (2.4)
Australia	4 (0.5)
Asia	1 (0.1)
Schooling	
Junior	262 (36.4)
High school	445 (61.8)
College or more	13 (1.8)
Marital status	
Single	419 (56.8)
Married/living with companion	308 (41.7)
Divorced/widow	11 (1.5)
Social status of the family of origin	
Number of family members	3.9 (2.3; 1.0–44.0)
Number of rooms/family	4.8 (2.2; 1.0–30.0)
Family members/number of rooms	0.94 (0.63 0.19–7.3)

Values are number (%) or mean (SD; range).

observed for the questions related to both the training sessions and the championship games

Most players (92.6%) reported having used oral anti-inflammatory products in the previous year, and most were current users (86.1%) (table 3). Analgesics were reportedly used by 36% of the players, who were, for the most part, current users. Roughly 30% of the players were using antibiotics for an infection at the time of the interview. The use of supplements was very high, with over 80% of the players reported to be current users.

A large proportion of the subjects reported the amount of drugs used in a year (table 4). For anti-inflammatory drugs, 50% of the current users indicated that they used anti-inflammatory products for less than a month a year, and 76% were current users of analgesics. Almost all the current users used supplements on a daily basis, with a small percentage of subjects using them more than once a day. The use of vitamins was reported by roughly 30% of the subjects, most of the time for less than 4 months a year.

A large proportion of subjects (n = 83) reported current use of all four categories: vitamins, supplements and analgesic and anti-inflammatory drugs. .

Multivariate analysis among the factors that could determine the use of permitted drugs showed that the use of supplements, but not vitamins, was associated with weekly hours of training.

Table 2 Description of the usual amount of physical activity

Training	
Training sessions (n/week)	6.1 (0.82; 4.0–16.0)
Length of training (h/week)	11.9 (5.8; 1.5–124.0)
Muscular training (h/week)	3.2 (2.0; 0.05–30.0)
Technical training (h/week)	4.8 (2.3; 0–30.0)
Tactical training (h/week)	4.1 (2.0; 0–20.0)
Legs engagements (n/day)	8.9 (8.5 (0–80.0)
Head engagements (n/day)	3.8 (6.7; 0–110.0)
Head shots (n/day)	8.6 (7.2; 0–50.0)
Championship games	
Maximum number of head shots/game	37.1 (45; 0–500.0)
Head engagements (n/game)	6.9 (8.2; 0–75.0)
Legs engagements (n/game)	16.2 (13; 0–110.0)

Values are mean (SD; range).

Table 3 Chronic use of permitted drugs

Drug category	n (%)
Non-steroidal anti inflammatory	
No	55 (7.4)
Yes	687 (92.6)*
Analgesics	
No	475 (64)
Yes	267 (36)†
Antibiotics (current use)	
No	517 (69.7)
Yes	225 (30.3)
Supplements (minerals, supplements and creatine —current use)	
No	128 (17.2)
Yes	614 (82.8)
Vitamins (current use)	
No	795 (72)
Yes	310 (28)

*639 (86.1%) current users.
†243 (32.7%) current users.

The number of training sessions was significantly associated with the use of anti-inflammatory drugs.

DISCUSSION

Our survey indicates that professional soccer players use a large amount of permitted drugs. Of the professional soccer players, 93% reported a high use of non-steroidal anti-inflammatory drugs, a higher value than that indicated by a study on student football players,[5] where 75% had used these drugs in the previous 3 months, and 15% were daily users. The reported use of non-steroidal anti-inflammatory drugs in Canadian Olympic athletes was 33.5% in Atlanta and 36.3% in Sydney.[6] As a comparison, a survey conducted in Finland using the nation's prescription database reported a frequency of use in 17–19% of the general population.[11]

Over 82% of the players in our survey reported current use of supplements. Use of supplements administered by a doctor to the Canadian Olympic athletes was measured by a questionnaire. The percentage of current users was 69% in the Atlanta Games and 74% in the Sydney Games.[6] Use of supplements was also measured by a self administered questionnaire distributed

Table 4 Amount of use of permitted drugs in current users

Anti-inflammatory drugs (623/639 current users)	
⩽10 days/year	168 (27)
11–30 days/year	189 (30)
31–60 days/year	132 (21)
>60 days/year	134 (22)
Analgesics (210/243 current users)	
⩽10 days/year	95 (45)
11–30 days/year	65 (31)
31–60 days/year	35 (17)
>60 days/year	15 (7)
Supplements (533/614 current users)	
Daily	423 (79)
Twice a day	83 (16)
>Twice a day	26 (5)
Vitamins (266/310 current users)	
⩽120 days/year	192 (72)
121–365/year	65 (24)
>365/year	9 (4)

Values are n (%).

What is already known on this topic

Use of permitted drugs has been reported in student football players and in Canadian Olympic athletes. Use of non-permitted drugs is suggested by anecdotal reports, where some reports related to judicial inquiries are episodic.

What this study adds

Professional soccer players use a large amount of permitted drugs. Over 82% of the players reported current use of supplements, 93% of the subjects used non-steroidal anti-inflammatory drugs, and 28% used vitamins.

to the World Master Athletes in Germany. A total of 69.2% of the men used nutritional supplements. [12] The use of supplements in the general US population of men is lower, around 46.9% in the National Health and Nutrition Examination Survey.[13] This survey suggests that subjects reporting strenuous physical activity are more likely to be supplement consumers. The high use of supplements in professional athletes is not surprising, especially because they are recommended in order to reduce physical exercise-induced oxidative stress and tissue damage. Growing evidence indicates that reactive oxygen species are responsible for exercise-induced protein oxidation and contribute to muscle fatigue.[14 15] In addition, high-level physical activity may lead to suppression of the immune system, which could be compensated for by supplementation with dietary micronutrients.[16]

The reported use of vitamins in our study was 28%, whereas this value ranged from 32% in the National Health and Nutrition Examination Survey [6] to 66.5% in the vitamins and lifestyle cohort study.[17]

Some aspects of players' use of permitted drugs merit further comment. From the team doctors' questionnaires, it seems that the use of supplements and vitamins should be less than that reported by the players. This suggests that team doctors are not always consulted by players about their use of supplements and vitamins, and perhaps about the use of other drugs. This is of particular concern because creatine is often included among the supplements, and could consequently be used in excessively high and potentially dangerous doses. Another reason for concern is the reported possibility that supplements may be contaminated with banned substances; therefore unregulated use may create health concerns.[18]

In a study similar to ours, but conducted in England,[9] almost 58% of the players reported using vitamin pills, 23% used mineral pills, 24% used protein powders and 37% used creatine.

One of the limitations of our study is that we obtained reported information on permitted drug use, but we did not objectively quantify the actual consumption. However, if there is any imprecision in this information, it would be an under-reporting of the real frequency and amount of consumption.

The strength of our study is that for the first time we are reporting data on the frequency and amount of consumption of several permitted drugs. This open and clear approach was possible because of the long-standing collaboration established with the team doctors and the main societies involved in professional soccer. We see this as the first step towards regular monitoring of the players' need for, and use of, vitamins, supplements and other permitted drugs.

ACKNOWLEDGEMENTS

We thank the Panini Spa for furnishing the historical material, Rita Aldovisetti for data entry and the interviewers for data collection.

Funding: This study was supported by a grant from the Italian Ministry of Health to ET (grant number RF 03/232).

Competing interests: None.

The principal investigator had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

REFERENCES

1 **US Congress**. Committee of the Judiciary of the US Senate. *Hearing on steroid abuse in America*, 3 April, 1989.
2 **Australian Parliament**. *Drugs in sport: an interim report of the Senate Standing Committee on Environment, Recreation and the Arts*, Commonwealth of Australia, 1989.
3 **Waddington I**. *Sport, health and drugs*. London: E & F N Spon, 2000:153–69.
4 **Scarpino V**, Arrigo A, Benzi G. Evaluation of prevalence of doping among Italian athletes. *Lancet* 1990;**336**:1048–50.
5 **Warner DC**, Schnepf G, Barrett MS, *et al*. Prevalence, attitudes, and behaviors related to the use of nonsteroidal anti-inflammatory drugs (NSAIDs) in student athletes. *J Adolesc Health* 2002;**30**:150–3.
6 **Huang SH**, Johnson K, Pipe AL. The use of dietary supplements and medications by Canadian athletes at the Atlanta and Sydney Olympic Games. *Clin J Sport Med* 2006;**16**:27–33.
7 **Dodge TL**, Jaccard JJ. The effect of high school sports participation on the use of performance-enhancing substances in young adulthood. *J Adolesc Health* 2006;**39**:367–73.
8 **Mottram D**. Prevalence of drug misuse in sport. In: Mottram D, ed. *Drugs in sport*. 3rd edn. London: Routledge, 2003:369.
9 **Waddington I**, Malcolm D, Roderick M, *et al*. Drug use in English professional football. *Br J Sports Med* 2005;**39**:e18.
10 **Taioli E**. A prospective field epidemiological study on Italian professional soccer players. *Med Sport* 2006;**59**:291–301.
11 **Helin-Salmivaara A**, Klaukka T, Huupponen R. Heavy users of non-steroidal anti-inflammatory drugs: a nationwide prescription database study in Finland. *Eur J Clin Pharmacol* 2003;**59**:477–82.
12 **Striegel H**, Simon P, Wurster C, *et al*. The use of nutritional supplements among master athletes. *Int J Sports Med* 2006;**27**:236–41.
13 **Radimer K**, Bindewald B, Hughes J, *et al*. Dietary supplement use by US adults: data from the National Health and Nutrition Examination Survey, 1999–2000. *Am J Epidemiol* 2004;**160**:339–49.
14 **Powers SK**, DeRuisseau KC, Quindry J, *et al*. Dietary antioxidants and exercise. *J Sports Sci* 2004;**22**:81–94.
15 **Atalay M**, Lappalainen J, Sen CK. Dietary antioxidants for the athlete. *Curr Sports Med Rep* 2006;**5**:182–6.
16 **Venkatraman JT**, Pendergast DR. Effect of dietary intake on immune function in athletes. *Sports Med* 2002;**32**:323–37.
17 **White E**, Patterson RE, Kristal AR, *et al*. Vitamins and lifestyle cohort study: study design and characteristics of supplement users. *Am J Epidemiol* 2004;**159**:83–93.
18 **UK Sport, BOA, BOPA, NSMI, HCSC**. Position Statement of UK Sport, the British Olympic Association (BOA), the British Paralympic Association (BOPA), National Sports Medicine Institute (NSMI) and the Home Country Sports Council (HCSC). 2003. www.uksport.gov.uk (accessed 5 Apr 2007).